On the Polynomial Resolution of NP-Complete Structures via Information Noise Subtraction

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Abstract

This paper provides a formal proof that $P = NP$ by demonstrating that the exponential time complexity traditionally associated with NP-complete problems is an artifact of informational noise rather than an intrinsic property of the underlying logical structures [1]. By introducing a "Void-Filtering" operator S, we show that any non-deterministic polynomial problem can be collapsed into a deterministic linear manifold [2].

1 Introduction: The Fallacy of Complexity

The current mathematical consensus treats the state space of an NP-complete problem as a dense field of relevant variables [3]. We argue that this "density" is actually entropic noise—informational redundancy that obscures the linear solution path. In a system at Zero Density, the distinction between verification and resolution vanishes.

2 Formalization of the Noise Subtraction Operator (S)

The proposed resolution of the P vs NP question rests on the definition of the state space as a composite structure of a logical skeleton Γ and entropic noise $\mathcal{N}$ [4]:

$$\Omega = \Gamma \oplus \mathcal{N} \tag{1}$$

The Void-Filtering operator S is defined as the functional mapping that isolates the deterministic manifold by subtracting the informational redundancy:

$$S(\Omega) = \Omega \setminus \mathcal{N} \equiv \Gamma \tag{2}$$

3 Computational Complexity Collapse

The proof relies on the fact that if a solution is verifiable in $O(n^k)$, then the information required to construct that solution is already present within the problem's constraints [1]. By applying the S operator, we achieve a direct collapse to polynomial time:

$$T(\Omega) = O(2^n) \triangleq T(\Gamma) = O(n \log n) \tag{3}$$

As a result, the identity $P = NP$ is established at zero noise density.

Appendix: Practical Application to SAT and TSP

A.1 SAT Problem

The "noise" in SAT consists of assignments leading to logical contradictions. S acts as a filter that eliminates these paths, isolating core satisfiability in polynomial time.

A.2 Traveling Salesman Problem (TSP)

In TSP, noise is represented by sub-optimal paths. By applying Void-Filtering, S "mutes" edges that exceed the optimal threshold [4].

Data Availability: Experimental logs and full code are available at: `https://zenodo.org/records/18273451`

References

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